

Cunningham RADIO TUBES

C-57

TRIPLE-GRID AMPLIFIER

The 57 is a triple-grid tube recommended especially for service as a biased detector in a-c receivers designed for its characteristics. In such service, this tube is capable of delivering a large audio-frequency output voltage with relatively small input voltage. Other applications of the 57 include its use as a low signal-input, screen grid amplifier tube and as an automatic volume control tube. The 57 is characterized by the small overall size, the dome-top bulb, the internal shield in the dome, the rigidity of electrode assembly, and the fifth electrode or suppressor with its own base pin terminal. Equally significant among its electrical features are its relatively low heater power consumption, its sharp plate current "cut-off" with respect to grid voltage, and its adaptability of electrode combinations to unusual circuit applications.

The internal shield is a distinctive feature in the design of this tube. It is placed in the bulb dome above the electrode assembly and is connected within the tube directly to the cathode. The dome-top bulb makes possible close proximity of the external and internal shields and, therefore, a low effective grid-plate capacitance. The form of the external shield-can may be somewhat modified depending upon the receiver design requirements for minimum grid-plate and output capacitance.

CHARACTERISTICS

Heater Voltage (A. C. or D. C.)	2.5	Volts
Heater Current	1.0	Ampere
Plate Voltage	250 *max.*	Volts
Screen Voltage	100 *max.*	Volts
Grid Voltage	−3	Volts
Plate Current	2.0	Milliamperes
Screen Current	1.0	Milliampere
Plate Resistance	Greater than 1.5	Megohms
Amplification Factor	Greater than 1500	
Mutual Conductance	1225	Micromhos
Effective Grid-Plate Capacitance (with shield can)	0.010 *maximum*	μμf.
Input Capacitance	5.2	μμf.
Output Capacitance	6.8	μμf.
Overall Length	4 19/32" to 4 27/32"	
Maximum Diameter	1 9/16"	
Bulb (See page 42, Fig. 7)	ST-12	
Cap	Small Metal	
Base	Small 6-Pin	

INSTALLATION

For **base** and socket information, refer to **base** for type 58.

For **heater** operation and **cathode** connection, refer to Installation for type 56.

The **screen** voltage may be obtained from a potentiometer or bleeder circuit across the B-supply source. Due to the screen current characteristics of the 57, the use of a resistor in series with the high voltage supply may be employed for obtaining the screen voltage provided the cathode-resistor method of bias control is used. This method, however, is not recommended if the high voltage B-supply exceeds 250 volts.

Complete **shielding** of detector circuits **employing** the 57 is generally necessary, since considerable voltage at carrier frequency is usually present in the plate circuit even though the latter is by-passed with a low impedance capacitor. Two-section filters in the plate circuit are frequently necessary to prevent radio-frequency feed-back to the input of the detector.

In receivers employing a built-in loudspeaker, acoustic shielding may be necessary to prevent microphonic feed-back when a strong radio-frequency carrier voltage is present on the tube elements. It should be noted also that condenser plates may cause an audio howl due to mechanical feed-back from the speaker.

APPLICATION

As a **biased detector,** the 57 is particularly recommended because of its ability to deliver a large audio-frequency output voltage of good quality with a fairly small radio-frequency signal input. Recommended conditions for the 57 as a biased detector are as follows: Plate voltage, 250 volts; screen voltage, 100 volts; grid bias voltage, −6 volts (approx.); plate load, 250000 ohm resistor, or a 500 henry choke shunted by a 0.25 megohm resistor. For resistance load, the plate voltage will be the supply voltage minus the voltage drop in load caused by specified plate current (adjusted to 0.1 milliampere with no a-c input signal).

Detector bias may be obtained from a bleeder circuit, from a resistor in the cathode circuit, or from a partial self-biasing circuit. The cathode-resistor method permits of higher output at low percentage modulation since the input signal may be increased almost in inverse proportion to the modulation without resulting in objectionable distortion.

As a **radio-frequency amplifier,** the 57 may be used particularly in applications where the r-f signal applied to the grid is relatively low, that is, of the order of a few volts. In such cases either screen or control grid voltage (or both) may be varied to control the receiver volume. When larger signals are involved, a super-control amplifier tube should be employed to prevent the occurrence of excessive cross-modulation and modulation distortion. Recommended operating conditions for amplifier service are given under CHARACTERISTICS.

As an **audio-frequency amplifier** in resistance-coupled circuits, the 57 may be operated under the following conditions: Plate supply voltage, 250 volts, applied through a plate coupling resistor of 250000 ohms; screen voltage, 100 volts; plate current, 0.75 ma., approx.; grid voltage, −4.5 volts. The grid resistor should have a value not exceeding 1.0 megohm.

